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# Index to Selected Science Publications of the Interior Columbia Basin Ecosystem Management Project

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# **Index to Selected Science Publications of the Interior Columbia Basin Ecosystem Management Project**

## **Interior Columbia Basin Ecosystem Management Project: Scientific Assessment**

Thomas M. Quigley, Editor

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## Preface

The Interior Columbia Basin Ecosystem Management Project was initiated by the USDA Forest Service and the USDI Bureau of Land Management to respond to several critical issues including, but not limited to, forest and rangeland health, anadromous fish concerns, terrestrial species viability concerns, and the recent decline in traditional commodity flows. The charter given to the project was to develop a scientifically sound, ecosystem-based strategy for managing the lands of the interior Columbia River basin administered by the USDA Forest Service and the USDI Bureau of Land Management. The Science Integration Team was organized to develop a framework for ecosystem management, an assessment of the socioeconomic biophysical systems in the basin, and an evaluation of alternative management strategies. This paper is one in a series of papers developed as background material for the framework, assessment, or evaluation of alternatives. It provides more detail than was possible to disclose directly in the primary documents.

The Science Integration Team, although organized functionally, worked hard at integrating the approaches, analyses, and conclusions. It is the collective effort of team members that provides depth and understanding to the work of the project. The Science Integration Team leadership included deputy team leaders Russel Graham and Sylvia Arbelbide; landscape ecology—Wendel Hann, Paul Hessburg, and Mark Jensen; aquatic—Jim Sedell, Kris Lee, Danny Lee, Jack Williams, Lynn Decker; economics—Richard Haynes, Amy Horne, and Nick Reyna; social science—Jim Burchfield, Steve McCool, and Jon Bumstead; terrestrial—Bruce Marcot, Kurt Nelson, John Lehmkuhl, Richard Holthausen, and Randy Hickenbottom; spatial analysis—Becky Gravenmier, John Steffenson, and Andy Wilson.

Thomas M. Quigley  
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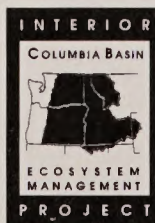
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Interior Columbia Basin  
Ecosystem Management  
Project



## Introduction

The Interior Columbia Basin Ecosystem Management Project (ICBEMP) is a joint effort of the U.S. Department of Agriculture, Forest Service (FS) and the U.S. Department of the Interior, Bureau of Land Management (BLM). The project is charged with developing a scientifically based ecosystem management strategy for lands administered by the FS and BLM within the interior Columbia River basin (hereafter referred to as the basin<sup>1</sup>). The total area of the basin includes more than 145 million acres (58 million ha) of which 76 million acres (30 million ha) are administered by the FS and BLM.

The Science Integration Team, the scientific branch of ICBEMP, developed a scientific framework for ecosystem management, conducted a detailed functional assessment, and generated an integrated assessment linking landscape, aquatic, terrestrial, social, and economic characterizations to describe biological, physical, and social systems. This scientific assessment provides research on broad-scale issues in the basin, integrates data across disciplines, and provides both spatial understanding and temporal depth for many critical issues concerning basin ecosystems. The spatial and temporal components of the work enrich our understanding of current and potential future ecosystem conditions as well as the risk and opportunities now present. Land managers are using the science information to develop management strategies and to provide a context for FS and BLM management plans.

## Purpose

This publication provides an easy-to-use, single index to the following major publications of the Science Integration Team:

- *A Framework for Ecosystem Management in the Interior Columbia Basin and Portions of the Klamath and Great Basins* GTR - PNW-374 (2c.)
- *An Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins* (4 volumes) GTR PNW-405
- *Highlighted Scientific Findings of the Interior Columbia Basin Ecosystem Management Project* GTR PNW-404
- *Integrated Scientific Assessment for Ecosystem Management in the Interior Columbia Basin and portions of the Klamath and Great Basins* GTR PNW-382 (2c.)
- *Status of the Interior Columbia Basin: Summary of Scientific Findings* GTR PNW-385 (2c.)

These publications together exceed 2,000 pages in length. Our continuing goal for the scientific assessment is to make the information understandable, accessible, and useful. With this index, we link detailed technical writing with more easily understood highlights and summaries. The abstracts

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<sup>1</sup> The basin is defined as those portions of the Columbia River basin inside the United States and east of the crest of the Cascade Range, and those portions of the Klamath River basin and the Great Basin in Oregon.



from these documents are included below for easy reference. A CD-ROM of these documents is available from the Pacific Northwest Research Station. Additional supporting material also is being published.<sup>2</sup>

## Abstracts of Indexed Publications

**Haynes, Richard W.; Graham, Russell T.; Quigley, Thomas M., tech. eds. 1996.** A framework for ecosystem management in the interior Columbia basin including portions of the Klamath and Great Basins. Gen. Tech. Rep. PNW-GTR-374. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 66 p.

A framework for ecosystem management is proposed. This framework assumes that the purpose of ecosystem management is to maintain the integrity of ecosystems over time and space. It is based on four ecosystem principles: ecosystems are dynamic, can be viewed as hierarchies with temporal and spatial dimensions, have limits, and are relatively unpredictable. This approach recognizes that people are part of ecosystems and that stewardship must be able to resolve tough challenges, including how to meet multiple demands with finite resources. The framework describes a general planning model for ecosystem management that has four iterative steps: monitoring, assessment, decision-making, and implementation. Because ecosystems cross jurisdictional lines, the implementation of the framework depends on partnerships among land managers, the scientific community, and stakeholders. It proposes that decisionmaking be based on information provided by the best available science and the most appropriate technologies for land management.

Keywords: Ecosystem assessment, ecosystem principles, ecosystem management, planning models, management goals, risk analysis.

**Quigley, Thomas M.; Arbelbide, Sylvia J., tech. eds. 1997.** An assessment of ecosystem components in the interior Columbia basin and portions of the Klamath and Great Basins. Gen. Tech. Rep. PNW-GTR-405. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station; U.S. Department of the Interior, Bureau of Land Management. 4 vol. [Quigley, Thomas M., tech. ed.; The Interior Columbia Basin Ecosystem Management Project: Scientific assessment].

These volumes provide detailed information about current conditions and trends for the biophysical and social systems within the basin. This information can be used by land managers to develop broad land management goals and priorities and provides the context for decisions specific to smaller geographic areas. The assessment area covers about 8 percent of the U.S. land area, 24 percent of the Nation's National Forest System lands, and 10 percent of the Nation's BLM-administered lands and contains about 1.2 percent of the Nation's population. This results in a population density less

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<sup>2</sup> Many of the ICBEMP science publications may be ordered by providing your mailing address and the publication title and series (GTR) number to Publication Distribution, Pacific Northwest Research Station, P.O. Box 3890, Portland, OR 97208-3890; phone (503)808-2138; PNW web site: <http://www.fs.fed.us/pnw>. Related ICBEMP science publications are available through Publications, Ogden Service Center, Rocky Mountain Research Station, 324 25th Street, Ogden, UT 84401-2394; phone (801)625-5437; or email: [pubs/rmrs\\_ogden@fs.fed.us](mailto:pubs/rmrs_ogden@fs.fed.us). Information on availability of this material, as well as general information on the Interior Columbia Basin Ecosystem Management Project, is available on the web-site, [www.icbemp.gov](http://www.icbemp.gov).



than one-sixth of the U.S. average. The area has experienced recent, rapid population growth and generally has a robust, diverse economy. As compared to historical conditions, the terrestrial, aquatic, forest, and rangeland systems have undergone dramatic changes. Forested landscapes currently are more susceptible to fire, insect, and disease than under historical conditions. Rangelands are highly susceptible to noxious weed invasion. The disturbance regimes operating on forest and range land have changed substantially, with lethal fires dominating many areas where nonlethal fires historically were the norm. Terrestrial habitats that have experienced the greatest decline include the native grassland, native shrubland, and old forest structures. There are areas within the assessment area that have higher diversity than others. Aquatic systems are now more fragmented and isolated than historically, and the introduction of non-native fish species has complicated current status of native fishes. Core habitat and population centers remain as building blocks for restoration. Social and economic conditions within the assessment area vary considerably, depending to a great extent on population, diversity of employment opportunities, and changing demographics. Those counties with the higher population densities and greater diversity of employment opportunities are generally more resilient to economic downturns. This assessment provides a rich information base, including over 170 mapped themes with associated models and databases, from which future decisions can benefit.

Keywords: Columbia basin, biophysical systems, social systems, ecosystem.

**Quigley, Thomas M.; Bigler Cole, Heidi. 1997.** Highlighted scientific findings of the Interior Columbia Basin Ecosystem Management Project. Gen. Tech. Rep. PNW-GTR-404. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station; U.S. Department of the Interior, Bureau of Land Management. 34 p.

Decisions regarding 72 million acres of FS- and BLM-administered lands will be based on scientific findings brought forth in the Interior Columbia Basin Ecosystem Management Project. Highlights of the scientific findings are presented. Project scientists drew three general conclusions: (1) Conditions and trends differ widely across the landscape; as a result, one-size-fits-all strategies will neither effectively restore nor maintain ecosystems. (2) Ecosystem elements are linked to one another; effective ecosystem management requires an understanding of these links. (3) The scientific assessment highlighted a wide variety of risks important to ecological and socioeconomic systems. It also brought forth numerous opportunities to restore ecological systems and provide goods and services. To realize the opportunities, managers must recognize and manage the risks. Three management options were analyzed: current direction, active restoration, and reserve system establishment. Analysis revealed that active restoration was effective in addressing basinwide risks and opportunities.

Keywords: Ecosystem management, ecosystem assessment, ecological integrity, socioeconomic resiliency, risk management.

**Quigley, Thomas M.; Haynes, Richard W.; Graham, Russell T., tech. eds. 1996.** Integrated scientific assessment for ecosystem management in the interior Columbia basin and portions of the Klamath and Great Basins. Gen. Tech. Rep. PNW-GTR-382. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 303 p. (Quigley, Thomas M., tech. ed.; The Interior Columbia Basin Ecosystem Management Project: Scientific assessment).

This document links landscape, aquatic, terrestrial, social, and economic characterizations to describe biophysical and social systems. Integration was achieved through a framework built around six goals for ecosystem management and three different views of the future. These goals are to maintain evolutionary and ecological processes; manage for multiple ecological domains and evolutionary timeframes; maintain viable populations of native and desired non-native species; encourage social and economic resiliency; manage for places with definable values; and manage to maintain a variety of



ecosystem goods, services, and conditions that society wants. Ratings of relative ecological integrity and socioeconomic resiliency were used to make broad statements about ecosystem conditions in the basin. Currently in the basin, high integrity and resiliency are found on 16 and 20 percent of the area, respectively; low integrity and resiliency are found on 60 and 68 percent of the area. Different approaches to management can alter the risks to the assets of people living in the basin and to the ecosystem itself. Continuation of current management leads to increasing risks while management approaches focusing on reserves or restoration result in trends that mostly stabilize or reduce risks. Even where ecological integrity is projected to improve with the application of active management, population increases and the pressures of expanding demands on resources may cause increasing trends in risk.

Keywords: Ecosystem assessment, management and goals, ecological integrity, socioeconomic resiliency, risk management.

**U.S. Department of Agriculture, Forest Service. 1996.** Status of the interior Columbia basin: summary of scientific findings. Gen. Tech. Rep. PNW-GTR-385. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station; U.S. Department of the Interior, Bureau of Land Management. 144 p.

This paper summarizes the scientific findings from the Interior Columbia Basin Ecosystem Management Project. A framework for ecosystem management is described that assumes the broad purpose is to maintain the integrity of ecosystems over time and space. An integrated scientific assessment links landscape, aquatic, terrestrial, social, and economic characterizations to describe the biophysical and social systems. The status of ecosystems is described in terms of current conditions and trends under three broadly defined management options. The scientific information brought forward will be used in decisionmaking and may amend FS and BLM plans within the basin. The information highlighted here represents an integrated view of biophysical and socioeconomic elements at a scale never before attempted. The risks and opportunities are characterized in the broad context of the basin for managers and the public to use as a foundation for discussion about future management.

Keywords: Ecosystem assessment, ecosystem management, ecosystem integrity, risk analysis.



## Index

This index is not intended to be a comprehensive listing of all occurrences of the following terms. Rather, it is meant as an aid in locating discussions pertinent to the variety of concepts listed. Please use this index as a way to access the rich discussion available in the publications themselves. The individual volumes are designated as follows, and page numbers refer only to the volumes they follow.

- F            *A Framework for Ecosystem Management in the Interior Columbia Basin and Portions of the Klamath and Great Basins* (PNW-GTR-374)
- I            *Integrated Scientific Assessment for Ecosystem Management in the Interior Columbia Basin and portions of the Klamath and Great Basins* (PNW-GTR-382)
- C (Vol no.)   *An Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins* (4 volumes) (PNW-GTR-405)
- S            *Status of the Interior Columbia Basin: Summary of Scientific Findings* (PNW-GTR-385)
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